V_{mix} = Total dilute exhaust flow volume flow in m^3 per test segment corrected to 20°C and 101.3 kPa.

C_i = The concentration of species i, in ppm or ppmC, corrected for background contribution according to the equation in paragraph (b)(2) of this section.

f_{di} = The density factor for species i. The density factors are 576.8 g/m^3 for THC, 1913 g/m^3 for NO_x, and 1164 g/m^3 for CO.

(2) The equation to calculate C_i is:

$$C_i = C_{sample} - C_{background} [1-(1/DF)]$$

Where:

C_{sample} = Concentration of species i in the diluted exhaust sample, in ppm or ppmC.

$C_{background}$ = Concentration of species i in the dilution air background sample, in ppm or ppmC.

DF = Dilution factor, as calculated in paragraph (a) of this section.

(c) Calculate total brake work (kW-hr) done during the emissions sampling period of each segment or mode.

(d) Calculate emissions in g/kW-hr by dividing the mass emission rate (g/test segment) by the total brake work for the test segment.

(e) Apply deterioration factors or other adjustment factors to the brake-specific emission rate in paragraph (e) as specified in the standard-setting part.

EFFECTIVE DATE NOTE: At 69 FR 39262, June 29, 2004, §1065.615 was amended by revising paragraphs (c), (d) and (e), effective Aug. 30, 2004. For the convenience of the user, the revised text is set forth as follows:

§1065.615   Bag sample calculations.

*   *   *   *   *

(c) Calculate total brake work (kW-hr) done during the emissions sampling period of each segment or mode and then weight it by the applicable test cycle weighting factors.

(d) Calculate emissions in g/kW-hr by dividing the total weighted mass emission rate (g/test) by the total cycle-weighted brake work for the test.

(e) Apply deterioration factors or other adjustment factors to the brake-specific emission rate in paragraph (d) of this section, as specified in the standard-setting part.

§1065.620   Continuous sample analysis and calculations.

Use the sample analysis procedures and calculations of 40 CFR part 86, subpart N, for continuous samples.

[69 FR 39262, June 29, 2004]

EFFECTIVE DATE NOTE: At 69 FR 39262, June 29, 2004, §1065.620 was added to subpart G, effective Aug. 30, 2004.

Subpart H—Particulate Measurements

§1065.701   Particulate measurements.

Use the particulate sampling system and procedures specified in 40 CFR part 86, subpart N, to measure particulate emissions from compression-ignition nonroad engines.

[69 FR 39262, June 29, 2004]

EFFECTIVE DATE NOTE: At 69 FR 39262, June 29, 2004, §1065.701 was added to subpart G, effective Aug. 30, 2004.

Subpart I—Testing With Oxygenated Fuels

§1065.801   Applicability.

(a) This subpart applies for testing with oxygenated fuels. Except where specified otherwise in the standard-setting part, compliance with this subpart is not required for fuels that contain less than 25 percent oxygenated compounds by volume. For example, you generally would not need to follow the requirements of this subpart for tests performed using a fuel that was 10 percent ethanol and 90 percent gasoline, but you would need to follow these requirements for tests performed using a fuel that was 85 percent ethanol and 15 percent gasoline.

(b) This subpart specifies sampling procedures and calculations that are different than those used for non-oxygenated fuels. The other test procedures of this part apply for testing with oxygenated fuels.

§1065.805   Sampling system.

(a) Use the sampling procedures specified in 40 CFR part 86 for methanol and formaldehyde to measure alcohols and aldehydes in the exhaust. This requires the following:

(1) Bubbling a sample of the exhaust through water to collect the alcohols.

(2) Passing a sample of the exhaust through cartridges impregnated with 2,4-dinitrophenylhydrazine to measure aldehydes.

(b) Use good engineering judgment to measure other oxygenated compounds in the exhaust.

§ 1065.810 Calculations.

(a) *THCE emissions.* (1) Calculate THCE emissions as the sum of the mass of the nonoxygenated hydrocarbons in the exhaust and the carbon-equivalent mass of each measured oxygenated species in the exhaust.

(2) Calculate carbon-equivalent mass of each measured oxygenated species from the following equation:

Carbon equivalent = 13.8756 × MOC/ MWPC

Where:

MOC is the mass of the oxygenated compound in the exhaust, and MWPC is the molecular weight of compound per carbon atom of compound.

(b) *NMHCE emissions.* Calculate NMHCE emissions as either:

(1) The sum of the mass of the nonoxygenated nonmethane hydrocarbons in the exhaust and the carbon-equivalent mass of each measured oxygenated species in the exhaust.

(2) THCE minus the mass of methane in the exhaust.

(c) *Sample calculation.* (1) Assume the following emissions for a test: 40.00 grams of nonoxygenated hydrocarbons, 100.00 grams of ethanol, and 10.00 grams of acetaldehyde, and 1.00 gram of formaldehyde.

(2) The carbon-equivalent of the masses of oxygenated compounds are:

(i) 13.8756 × 100.00/(46.068/2) = 60.24 grams of ethanol.

(ii) 13.8756 × 10.00/(44.052/2) = 6.30 grams of acetaldehyde.

(iii) 13.8756 × 1.00/(30.026) = 0.46 grams of formaldehyde.

(3) THCE = 40.00 + 60.24 + 6.30 + 0.46 = 107.00 grams per test.

Subpart J—Field Testing

§ 1065.901 Applicability.

(a) The test procedures in this subpart measure brake-specific emissions from engines while they remain installed in vehicles or equipment in the field.

(b) These test procedures apply to your engines as specified in the standard-setting part. For example, part 1048 of this chapter specifies emission standard to be used for in-use tests conducted in accordance with the provisions of this part. Unless this subpart is specifically mentioned in the standard-setting part, compliance with the provisions of this subpart is not required.

§ 1065.905 General provisions.

(a) Unless the standard-setting part specifies deviations from the provisions of this subpart, testing conducted under this subpart must conform to all of the provisions of this subpart.

(b) Testing conducted under this subpart may include any normal in-use operation of the engine.

§ 1065.910 Measurement accuracy and precision.

(a) Measurement systems used for in-use testing must be accurate to within ±5 percent compared to engine dynamometer testing conducted according to the test procedures of this part that are applicable for your engine. These systems must also have a precision of ±5 percent or better. Determine accuracy and precision of an in-use system by simultaneously measuring emissions using the engine-dynamometer test procedures of this part and the in-use system. To have a statistically valid sample, measure emissions during at least 3 tests each for at least 3 different engines. You must conduct these verification tests using the test cycle specified in the standard-setting part, unless we approve a different test cycle.

(1) A system must meet the following conditions to be considered sufficiently accurate:

(i) The correlation coefficient (r) for a least-squares linear fit that includes the origin must be 0.95 or higher.

(ii) The average ratio (for all tests) of the emission rate from the in-use system divided by the emission rate from the dynamometer procedure must be 0.97 to 1.05.

(2) For a system to be considered sufficiently precise, the average coefficient of variance for all engines must be 5 percent or less for each pollutant.

NOTE: Increasing the length of the sampling period may be an effective way to improve precision.